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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/991,466	11/21/2001	Coming Chen	UMC-98-048 CON	3828

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EXAMINER

BARRECA, NICOLE M

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 03/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/991,466

Applicant(s)

CHEN ET AL.4/18/98

Examiner

Nicole M Barreca

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 February 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☒ Certified copies of the priority documents have been received in Application No. 09/075,618.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 4-16 are pending in this application.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 8-13 and 14-16 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 8 recites that the rectangular-profiled portion is etched "such that the oxide layer has a substantially uniform maximum thickness". However Figure 2D illustrates that the oxide layer is not of uniform thickness but rather of varying thickness over the trenches and active regions after the rectangular-profiled portion is etched.

The specification and figures have no mention of "any further deposition of material on the oxide layer", as recited in claims 11 and 14.

The specification does not disclose the polishing step is performed "immediately" after the rectangular-profiled portion of the oxide layer is removed, as recited in claims 12 and 15.

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Figure 3D and the corresponding specification, as argued by the applicant, does not support that the oxide layer on the edge part of the large active region is laterally smaller than the small active region, as recited in claims 13 and 16.

(Figure 2D and the corresponding specification additionally do not disclose that the oxide layer remaining on the edges of the large region is smaller than the small region.)

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 4-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 as written is unclear as to whether the small active region itself has a uniform thickness, or if the oxide layer remaining on the edge portion of the large active region and the oxide remaining on the small active region is of uniform thickness. Claim 8 as written is unclear as to whether the entire oxide layer has a uniform thickness, or if the oxide layer remaining on the edge portion of the large active region and the oxide remaining on the small active region is of uniform thickness. From the applicant's remarks it appears that the applicant intended both claim 4 and 8 to have the oxide layer remaining on the edge portion of the large active region and the oxide remaining on the small active region be of uniform thickness and this has been used ^{for} ~~as~~ the purpose of applying art.

Claims 12 and 15 recite a chemical-mechanical polishing step is performed immediately after the rectangular-profiled portion of the oxide layer is removed, while independent claims 4 and 8 recite a planarizing step after this removal. Are these two separate steps or is the CMP the same as the polishing step?

Claims 13 and 16 recite that the oxide layer on the edge part of the large active region is laterally smaller than the small active region. It is unclear the oxide layer on the edge part of the large regions refers ^{to} ~~to~~ oxide remaining on both edges or just a single edge. It is also unclear if this oxide layer is laterally smaller than the small active region itself or the oxide layer on the small active region.

Response to Amendment

6. The 102 rejection of claims 4-10 over Varian has been withdrawn in response to the applicant's amendments requiring the oxide layer (remaining on the edge portion of the large active region and remaining on the small active region) to be of uniform thickness. However, upon further consideration, a new ground(s) of rejection is made in view of Levy (US 6,103,592).

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 4, 6-8, 10-16 are rejected under 35 U.S.C. 102(e) as being

anticipated by Levy (6,103,592).

9. Silicon substrate 11 includes silicon dioxide/silicon nitride pad layer segments 14/14', with the silicon nitride acting as an etch stop, shallow trenches 9/9'9" and active areas 12 (large) and 12' (small). Silicon dioxide layer 22 is formed filling the trenches, followed by polysilicon layer 24. Polysilicon layer is polished, forming a particle reverse active mask. Figure 1F illustrates the device 10 after selective etching of the oxide layer. As can be seen, a rectangular-profiled portion of the oxide layer is removed over the center part on the active region, leaving oxide over the small active regions and oxide over the edges of the large active region. The oxide the small active regions and the oxide over the edges of the large active region are of uniform thickness. CMP was then used to planarize the silicon dioxide layer. See col.4, 1-63 and figures 1A-1G.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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11. Claims 5 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Levy as applied to claims 4 or 8 above, and further in view of Tran (6046106).

12. Levy is silent on the method used to deposit the silicon oxide layer and does not disclose forming the oxide layer using high density chemical vapor deposition (HDP-CVD). Tran teaches that HDP-CVD exhibits superior gap filling properties and high stability when compared to conventionally deposited oxides (col.2, 65-col.3, 8). It would have been obvious to one of ordinary skill in the art deposit the oxide layer using HDP-CVD in the method of Levy because Tran teaches that HDP-CVD exhibits superior gap filling properties and high stability when compared to conventionally deposited oxides.

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicole M Barreca whose telephone number is 571-272-1379. The examiner can normally be reached on Monday-Thursday (9AM-7PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Nicole M Barreca
Examiner
Art Unit 1756



2/28/05